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ANALYSIS OF SURGERY FOR BENIGN BILIARY DISORDERS

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CERTIFICATE

This is to certify that this dissertation entitled **"ANALYSIS OF SURGERY FOR BENIGN BILIARY DISORDERS"** is a bonafide record work done by **Dr.S.SURESH BHALAJI,** submitted as partial fulfillment for the requirement of **M.S.Degree Examination Branch I, General Surgery, March 2007.**

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INTRODUCTION

Biliary pathology includes disorders of gallbladder and rest of extra hepatic biliary apparatus. Common benign pathologies of biliary system demanding surgery, includes cholelithiasis and choledochalcyst .

Gall Bladder is a pear shaped saccular organ, which stores bile becomes a place for formation and growth of Gallstones. The Gallstone disease is more common in Western world Today the Incidence of Cholelithiasis is increasing considerably in India, Possibly due to change in the dietary habits. Which is becoming westernized and the life style which is changing. In India, North India shows 7 times more incidence than that in South India.

The operations on biliary tree and gall bladder rank next only to Hernia repair and appendiectomy in Northern India. In Southern India, picture is not clear.

Prevalence of Cholelithiasis, in Indian males and females is estimated as 4 % and 6 % respectively. The exact incidence of cholelithiasis is not known. Prevalence of cholelithiasis shows improved detection due to Imaging modalities particularly ultrasonogram.

Because of the Extensive studies of Etiology of gallstones and better understanding of the Pathogenesis in the past two decades, the management has become more appropriate and effective.

Proliferating research on the minimal invasive surgery especially after 1988 with the advent of Laparoscopic surgeries, Percuntaneous removal of stones and Extracorporeal shock wave lithotripsy has greatly motivated patients for undergoing early effective management.

AIMS OF THIS STUDY

1) To evaluate incidence of surgical procedures for benign pathologies in biliary tract(for adult patients) in TMCH (Thanjavur Medical College Hospital)
2) To evaluate the age incidence, sex incidence, the most common etiological and risk factors of benign pathologies in biliary tract.
3) To illustrate clinical presentation of common benign disorders of biliary tract.
4) To discuss the usefulness of different diagnosis for benign pathologies of biliary tract.
5) To study the various modes of management and their results.
6) To assess the incidence of post operative outcome and complications.

MATERIALS AND METHODS

40(Adult) patients clearly documented cases of benign biliary disorders admitted in the surgical units of Thanjavur Medical College Hospital between May 2005 to May 2006 constitutes the materials of this study.

A detailed history including that about previous treatment was elicited in all patients and thorough clinical examination was done in them.

Relevant preoperative investigations of Blood, Urine, Plain X-ray abdomen and USG were done in all possible cases. The operative findings and postoperative complications were recorded and carefully analysed. For selected patients “T” tube cholangiogram was done.

SURGICAL ANATOMY

GALL BLADDER

It is a pear shaped organ 7-10 cm long with a capacity of 30-50 ml. It is located in Gall Bladder fossa found at the junction of quadrate Lobe (Segment IV) and the Right lobe of liver along the line of rex, and is enclosed within its peritoneal sheath on three sides.

Gall bladder can be divided in to Fundus, Body, Infundibulum and neck.

FUNDUS

Projects slightly beyond the free margin of the liver, opposite the upper end of linea semilunaris. A partial folding of fundus may result in 'Phyrgian Cap' deformity. It was suggested that such gall bladders are at higher risk for lithiasis, but this has not been confirmed.

BODY

Occupies the Gallbladder fossa, covered by peritoneum on 3 surfaces. Sometimes GB is suspended in a mesentery, off the Inferior surface of the liver-wandering Gallbladder or rarely embedded deep inside the liver parenchyma Intrahepatic GB.

Occasionally, several anomalous peritoneal folds from the GB to the duodenum, colon, or stomach is seen in that order of frequency and are associated with the pathway of a large gallstone ulcerating from gallbladder in to the Intestinal tract.

INFUNDIBULUM

It is the angulated posterior portion of the body between the neck and the point of entrance of Cystic artery. It may show a eccentric bulging on its medial aspect, called Hartmann's pouch, and is often associated with Impaction of stone.

NECK

Neck curves up and forward and then sharping back and downward forming and 'S' to become the cystic duct Mucosal lining shows spiral folds give rise to 'spiral valve of heister' and may interfere with passage of instrument.

BILE DUCTS

The right and left lobes of liver are drained by ducts originating as bile canaliculi in the lobules and these canaliculi empty in to the canals of Herring in the Interlobular triads and these canals are collected in to ducts, and finally outside the liver, the Right and left hepatic ducts. Right hepatic duct is formed by the union of the anterior and posterior segment ducts of the right Lobe of the liver at porta hepatic. The average length of RHD is 0.9 cm.

Left hepatic duct is formed by the Union of medical and lateral segment ducts of the left lobe of the liver and average length is 1.7 cm- common hepatic duct is formed by union of the right and left hepatic duct and average diameter is about 0.4 cm. its lower end is defined as its junction with cystic duct.

CYSTIC DUCT

Cystic duct joins the hepatic duct at an angle of about 40º. The length of cystic duct and the manner in which it joins the hepatic duct vary. Obstruction of cystic duct leads to hydrops of Gallbladder contains white bile, composed only of mucus.

COMMON BILE DUCT

Begins at the union of duct and common hepatic duct and ends at the papilla of vater in the second part of the duodenum average diameter is 6mm CBD is divided in to 4 portions.

Supraduodenal, Retroduodenal, Pancreatic, Intramural.

Supraduodenal portion lies in the right free border of lesser omentum, to the right of the hepatic artery and anterior to the portal vein. Retroduodenal portion descends behind the 1st part of the duodenum and the pancreatic portion tunnel the gland substance. Intramural portion takes an oblique path averaging 1.5 cm though the duodenal wall and receives main pancreatic duct inferiorly. And both of them end in the ampulla of vater on the posteromendial wall of the second part of the duodenum.

BLOOD SUPPLY

Cystic artery arises usually from the right hepatic artery, reaches the Gallbladder behind the common hepatic duct and traverses through the hepato cystic triangle of calot and branches in to Anterior and Posterior branch. The Extrahepatic bile ducts are supplied by right hepatic artery above and gastroduodenal artery below with major trunks running along the medial and lateral walls of CBD, sometimes referred to as 3 o'clock and 9o'clock position.

ANOMALIES

It should be noted that considerable variations to the above description may exist. Those which occur most commonly are shown in figure. knowledge of such anomalies is of greatest importance to the surgeon, for failure to recognize them at operation may lead to disaster.

SURGICAL PHYSIOLOGY

BILIARY SECRETION

Bile is secreted continuously by the liver cells (hepatocytes) in to the biliary Canaliculi. Daily secretion is 500-1000 ml per day. Bile is secreted at a pressure of 150-250mm of water. If obstruction occurs, liver continues to secrete up to the pressure of 300mm of water, there after secretion ceases.

Hepatic bile is slightly alkaline and Gallbladder bile is more acidic than Hepatic bile.

The primary bile salts are cholate and chenodeoxycholate, conjugated with taurine and glycine and excreted in to the bile. 98 % is reabsorbed by enterohepatic circulation. In the intestine gut bacteria de-conjugates the primary bile salts and forms secondary bile salts deoxycholate and lithocholate.

Two important functions of Bile salts are

1) Formation of water soluble complexes with cholesterol, fatty acids and fat soluble vitamins and their absorption.
2) Reduction of surface tension and emulsification of fat.

Bile salts are powerful cholerectic which increases hepatic bile production. Cholesterol and Phospholipids synthesized in the liver are the principal lipids found in bile. The colour of the bile is due to the presence of pigment bilirubin diglucoronide, which is the metabolic product of breakdown of Hemoglobin in the reticuloendothelial system. In the intestine, bacteria convert it in to urobilinogen which is absorbed and excreted in urine.

FUNCTIONS OF GALLBLADDER

1) Stores the bile and concentrates it.
2) Periodically releases bile by contracting in response to meal.
3) Acidification of hepatic bile.
4) Production of glycol proteins.

CONTROL OF BILE FLOW

It is under control of neurogenic, humoral, and chemical stimuli. Vagal stimulation increases the secretion of bile, while splanchnic nerve stimulation results in decreased bile flow.

Hydrochloric acid, partly digested proteins and fatty acids in the duodenum stimulate the release of secretion from the duodenum that in turn increases bile production and bile flow.

Cholecystokinin also increases the hepatic secretion of bile. Other substances, which have effect on biliary secretion are VIP, caerulin and GASTRIN.

Information regarding the emptying of Gallbladder is incomplete, because it is impossible to incubate the healthy GB.

In between meals, when sphincter of oddi is closed, Gall bladder fills up when the CBD pressure is high.

Substances which contract the GB are

1) Cholecystokinin
2) Cholinergic hormones
3) Motilin

Substances which relaxes the GB are

1) Pancreatic polypeptide
2) Somatostain
3) Glucagons
4) VIP

AETIOPATHOGENESIS OF COMMON BENIGN BILIARY DISORDER

CHOLEDOCHAL CYST

A choledochal cyst is defined as an isolated or combined congenital dilation of the extrahepatic or intrahepatic biliary tree. The disease is much more common in Asians and in females. In children, the classic findings include a right upper quadrant abdominal mass, jaundice, and abdominal pain. Complications of choledochal cyst disease include cholangitis, jaundice, pancreatitis, portal hypertension, and cholangiocarcinoma. cyst excision, rather than cyst bypass, is the treatment of choice.

INCIDENCE / EPIDEMIOLOGY

Hospital admission rate for choledochal cyst disease is as high as 1 per 1000 admissions.,incidence of choledochal cyst is 1 per 100000 live birth.

ANATOMY / PATHOLOGY

Cystic dilation of the biliary tree can occur in the extrahepatic or in both. Histologically, two major types of choledochal cysts are seen: (1) in the glandular type, the normal cuboidal epithelium is seen, but there are glandular cavities in the mucosal layer associated with a chronic inflammatory cell infiltrate, (2) in the fibrotic type, the bile duct is thickened, with well-developed collagen fibers and a paucity of inflammation .

TODANI CLASSIFICATION

Type I cysts are seen in 40% to 60% of cases.

Type I : Dilation of the extrahepatic biliary tree: Ia-cystic, or Ic-fusiform

Type II : Saccular diverticulum of extrahepatic bile duct

Type III : Biliary tree dilation within the duodenum; choledochocele

Type IVa : Dilation of the intrahepatic and extrahepatic biliary tree

Type IVb : Multiple extrahepatic cysts

Type V : Dilation confined to the intrahepatic ducts (Caroli's disease).

ETIOLOGY

Three theories of choledochal cyst formation include:

1. The anamolous pancreatic duct-biliary junction theory
2. The abnormal canalization of the bile duct theory concerning abnormalities of automatic innervation of the extrahepatic biliary tree.
3. The theory concerning autonomic innervations of extrahepatic biliary tree.

AETIO PATHOGENESIS OF GALLSTONES

In spite of extensive research in the field of gallstones nothing conclusively has been put forward regarding the etiology and exact sequence of events that leads to the formation of gallstones.

The major question is why innocent gall bladder forms stones in few people alone. The subject of interest has turned towards what makes gall bladder a factory for gallstone production.

Most of the studies conducted were from the western world where cholesterol stones are common. Japanese are the other people have done a lot of research on this fascinating subject and who have Pigment stones commonly. Studies in India are limited. They point out that mixed stones are more prevalent in India.

CLINICAL CLASSIFICATIONS OF GALLSTONES

1. Pure cholesterol stone : 10%
2. Pigment stone : 15%
3. Cholesterol-pigment mixed stone : 75-80%

These can be analyzed by colour chromatography, thin layer chromatography and X-ray diffraction. In 1924, Aschoff classified the stones in to 4 categories.

1. Inflammatory.
2. Metabolic :

   Pure pigment [calcium Bilirubinate] and Pure cholesterol.
3. Combination stones:

   Primary – metabolic

   Secondary – Inflammatory
4. Stasis stones

   Primary stones of CBD.

Cholesterol Stones

Crystallographic studies such as X-ray diffraction method have demonstrated that more than one form of cholesterol may exist in stones, collected under different conditions.

Cholesterol is usually present as single crystals mainly as cholesterol monohydrate, whose axes are rabidly oriented with respect to the nucleus. Cholesterol stones may also contain carbonate and calcium palmitate. They are usually single, light yellow or even pure white, rounded or oval, being compared to unripe mulberries.

Pure Pigment Stones [Calcium Bilirubinate]

They are multiple, small and dark, Japanese have worked extensively in this type of stones as prevalence is very high in Japan. Two types are recognized:-

1. Calcium Bilirubinate stones found in oriental countries are associated with Ascariasis or E.Coli.
2. Pure pigment stones occurring without any infection but some times with haemolysis.

These stones are dark or reddish brown and fragile. Some stones are black or dark green.

Mixed Stones

These form the majority of the stones [75-80 %] which are multiple and multifaceted. The central portion of the stones represent the events occurring during initial stages of stone formation. They contain cholesterol, pigments, protein and sometimes parasites.

RISK FACTORS FOR PIGMENT STONES

DEMOGRAPHY

Oriental countries are more affected than the western world. Indian studies at Aligarh College concluded that mixed stones are the predominant variety in India [Vijay Pal et.al., 1980]. But in Kashmir the situation is different. The cholesterol stones are common. [Khuroo et.al. 1986].

Among the Orientals, Japan records the highest prevalence of pigment stones. Rural are more affected than Urban. This is ascribed to the fact that parasitic infestation of the bilairy tract is common in rural Japan. But evidences supporting this are lacking.

In Asians, brown pigment stones are common, and frequently associated with E.Coli infected bile. The location of stones also differs from the Cholesterol stones. The pigment stones mainly occupy the gall bladder and the common bile duct. Intrahepatic pigment stones are unknown.

HAEMOLYTIC ANAEMIA

Conditions with decreased life span of red blood cells including haemolysis from prosthetic heart valves, malaria, haemoglobinopathies and membrane defects like hereditary spherocytosis are associated with pigment stones but evidences are lacking.

ALCOHOLIC CIRRHOSIS

Pigment stones are more common among patients with cirrhosis than among normal persons. The mechanism underlying this association is unknown, although the hypersplenism and mild haemolytic anaemia that often accompany cirrhosis might be suspected of contributing to this increased incidence of gallstones.

INFECTED BILE

This is the oldest theory of gallstone formation.

No infection – No stone.

The Naunya's theory has got general support. Hence the nidus of stones is formed not only by bacteria, but also by inflammatory exudates or cellular exfoliation, parasites, and ova.

Moynihan has aptly described "Gallstone is a tomb stone erected to the memory of organism within it".

Bile bathing the gallstones is infected in Japanese. The most common infecting organism is Escherichia coli, a producer of Beta Glucuronidase which increases bile saturation by increasing unconjugated water insoluble bilirubin[47.]

Addition of glucuronidase, to bile in vitro resulted in the precipitation of calcium bilirubinate. D-glucuronic acid, an inhibitor of glucuronidase prevented the formation of calcium bilirubinate. Mechanisms other than the deconjugation of bilirubin also are involved in the association of the pigment stones with biliary infection. Ascaries lumbricoids, Round worm eggs are effective nucleating agents for the precipitation of calcium bilirubinate in vitro and may play similar part in vivo. Over half of stones examined in a large series in Japan showed ova of Ascaris lumbricoids. Another report from Vietnam showed this roundworm eggs were found in 70 % of gallstones there.

Parasitic infestation causes inflammation of the gall bladder as well as local chemical changes favorable to the precipitation of calcium salts.

Inflammation does the following

1. Reduces the gall bladder motility
2. Distorts the intrahepatic bile ducts.
3. Interferes with the concentrating ability of the gall bladder and impairs the cholesterol dissolving capacity of the gall bladder bile.

AGE

Like that of Cholesterol stones, the frequency of pigment stones with age. Predominantly seen during the 5^{th} to 7^{th} decade. Before the 1^{st} decade, pigments stones have been rarely reported in cases of congenital haemolytic diseases.

SEX

According to various Western texts, femaleness is not a risk factor for the pigment stone Indian studies show increased incidence in female sex. [Vijaya pal et.al., 1980; Gupta, 1967].

OBESITY

Has no definite role in the pigment stone formation. Pancreatitis, Total paraenteral nutrition and the advanced primary hyperparathyroidism are associated with pigment stones.

RISK FACTORS FOR CHOLESTEROL STONES

DEMOGRAPHY

Rate appears to be the highest in the Scandinavian countries and Northern Europe while North and South America have higher incidence. Sub shara and Asia reports very low incidence. Puma tribes of Arizona has the highest prevalence around 70 % due to its biological disposition to formation of the gallstones.

The prevalence of cholesterol Stones is higher in North-India. Kashmir in particular has the highest prevalence of the cholesterol stones which is comparable to Western Countries.

AGE AND SEX

The greatest incidence occurs between the 5^{th} and 8^{th} decade incidence is rare below 20 years old. In females Gallstones tend to occur more than in males, irrespective of the age, race etc., after puberty the ratio between females to males is 3:1 to 4:1 why females are affected more? Possible hypothesis are.

1. Estrogen and its effects.
2. Progesterone and its effects.

ESTROGEN

EXOGENOUS

Several studies have confirmed that an association between gall stone and use of exogenous estrogens, whether as oral contraceptives post menopausal estrogen replacement or estrogen administered to men.

The possible mechanisms are explained as follows.

1. Decreased chenodeoxycholic acid.
2. Increased Cholesterol saturation.
3. Increased Cholesterol secretion.
4. Cholestasis occurring with estrogens.

ENDOGENOUS

A definitely higher prevalence of gall stones among the females are documented in many studies through out the world. This sex difference appears to be being around the age of puberty and disappears around menopause.

Like oral contraceptives, endogenous estrogen also reduces bile acid pool and increases cholesterol secretion and the saturation thereby increasing gall stone formation. Multiparity also shows an increased incidence of gall stones.

PROGESTERONE

- Saturates bile
- Relaxes smooth muscle.
- Impaired gall bladder emptying.
- All may predispose to gallstone formation.

FAMILY HISTORY

Only first degree relatives have two fold risks while others studied showed no relationship. Siblings have a higher incidence of gall stone disease.

PARITY

With increasing parity, the gall stones are more common in young women probably due to repeated attacks on gall bladder by altered physiology of estrogen or progesterone on the biliary composition and smooth muscle function of the biliary apparatus.

OBESITY

In untreated obesity, Hepatobiliary tract disease is very much prevalent. The liver plays a key role in hyperlipidemia predisposition to the gallstone formation can be attributed to increased biliary cholesterol secretion in concert with changed nucleating factors and altered motility patient who tries to reduce weight by very low caloric diets, has high risk of the gall stone formation.

A large study conducted in obese people [1006 samples] shows in men and women of the 5^{th} decade with obesity an increased. Incidence of gallstones-1.7% and 1.8% respectively. This is not very high when compared with that in the same age group without obesity. In these obese patients, Triglycerides were found to be high. Based on these observations, various mechanisms of gall stone formation in obese individuals are postulated.

1. Increased saturation of bile in obese individuals due to excessive biliary secretion of cholesterol.
2. Cholesterol synthesis is related to H M G CO A reductase enzyme.
   H M G CO A reductase production is related to plasma insulin which is higher in obese persons and high fat intake also increases this enzyme.

DRUGS

EFFECTS OF CHOLESTEROL LOWERING DRUGS

Clofibrate

An increased frequency of the gallstones among users of clofibrate has been shown in two large clinical trials of the efficacy of this drug in heart diseases. The specific mode of its action on lipids is not known but there is a definite increase in the incidence of gallstones. These findings are suggestive of increased mobilisation of Cholesterol from body fat stores by clofibrate which predisposes them for stone formation.

Bileacid Sequestrants - Cholestyramine and Colestipol

An increased incidence of gallstones among users of bile acid sequestrants has not been documented. When used alone they have no effect on Cholesterol and bile acid metabolism .They act by trapping bileacids in the gut and, increasing their fecal loss, thereby decreasing the total bileacid pool. But compensatory increase in cholic acid in liver prevents excessive loss of bileacids. When these drugs are combined the loss of bileacid is marked with increased lithogenicity.

Oral Contraceptives

Its role is described in detail with effects of estrogen [exogenous] on gallstone formation. There is a definite increased incidence of gall stones among pill users.

EFFECTS OF GASTRO INTESTINAL DISORDERS AND SURGERIES

Ileal disease, resection and bypass

Bileacids are absorbed through out the length of the intestine, but especially in the ileum, where transport is more active. Bile acids return via portal vein and are resecreted into the bile in combination with newly synthesised bile acids. Bileacid synthesizing capacity of liver is compromised in most of the patients due to disease process itself, which limits the normal functions of liver.

Truncal Vagotomy

The gall bladder and the bilary tract are supplied by Celiac plexus, which loses its connections due to vagotomy. It may alter the physiology of the gall bladder emptying, leading to stasis. It may lead to formation of the gallstones. This was long debated matter. But there is no definite increase in the incidence of the gallstones following truncal vagotomy as pointed out by various studies because the gall bladder becomes adapted to the situation in a matter of 3 months till then irregular emptying was noted.

Cystic fibrosis with pancreatic insufficiency

An increased prevalence of the gallstones has been noted among children with cystic fibrosis. The possible mechanisms ascribed are

1. Increased mucus production and abnormal mucus

↓

Nucleation of stones

2. Interference with bileflow → stasis → promotes gallstone growth
3. Reduced bileacid pool due to interference of bileacid real1sorbtion due to poorly secreting pancreas.

DIAGNOSIS

CLINICAL FEATURES

CHOLEDOCHAL CYST

Choledochal cyst presents with abdominal pain, jaundice, mass abdomen, nausea, vomiting. Develop complications such as cholangitis, pancreatitis, cholecystitis, cirrhosis, Portal hypertension, cyst rupture.

SYMPTOMS AND SIGNS OF CHOLEDOCHAL CYST

- Abdominal mass
- Abdominal pain
- Jaundice
- Fever
- Nausea/vomiting
- Pancreatitis

CALCULOUS DISORDER

It depends on the site of the stone. A stone which is situated in the gall bladder may remain asymptomatic lifelong. But when it tries to move out of the gall bladder may get obstructed at the neck of the gall bladder resulting in cholecystitis and dull aching continuous pain. If the gall bladder contracts against obstruction, colicky pain in the right hypochondrium will result. The obstruction at

the neck may become relieved and the stone may fall back into the gall bladder or passed into the C B D.

In the common bile duct if the stone passes without much of obstruction it will merely produce mild pain, fever and jaundice. But if it is obstructed surgical jaundice will result. Intermittent pain, fever, jaundice may ensue. It is called charcot's triad. It is due to transient attacks of cholangitis. If this is accompanied by CNS disturbances and shock, then it is called Reynauld's pentad.

The stone that is obstructing the ampulla of Vater may cause pancreatitis in addition to cholangitis.

SYMPTOMS

Silent gallstones: Asymptomatic

Acute cholecystitis:

1. Right hypochondrial continuous dull pain sometimes spreading to entire upper abdomen.
2. Pain may be referred to right scapula, right shoulder or rarely to left side.
3. Pain lasts for 30-60 minutets without relief.
4. Attacks may be precipitated by fatty foods or heavy meals or mere palpation of abdomen.
5. The perspiring sufferer may lie motionless in a curled up posture.

Chronic cholecystitis:

In chronic cases abdominal distension, fullness eructation, flatulent dyspepsia following fatty meals is common.

SIGNS

Acute cholecystitis:

Abdominal movements with respiration decreases considerably. Local rigidity and tenderness ensue. Cutaneous hyperesthesia is maximal at 8th or 9th right thoracic segments posteriorly [BOAS SIGN] and right upper abdominal muscles are rigid. Gallbladder will not be palpable according to Courvoisier's law but it is not always true. Occasionally a tender mass of gall bladder with adherent omentum may be felt. On deep inspiration when a hand is kept below right hypochondrium, catching of breathing occurs due to severe tenderness. Liver edges may be tender.

Chronic cholecystitis:

Gallbladder is usually not palpable. Except for right hypochondrial tenderness nothing is specific

Choledocholithiasis:

1. Charcot's traid may be seen
2. If a large stone obstructs C B D then patient will have surgical jaundice passing clay colored stool, thick yellow urine and deeply jaundiced.

A stone obstructing the ampulla of Vater may result in epigastric pain, spreading to back with rigid upper abdomen and peritonitis due to pancreatitis.

Differential diagnosis for acute Cholecystitis

GIT

1. Acute Retrocaecal appendicitis/subhepatic appendicitis
2. Leaking duodenal ulcer.
3. Acute pancreatitis [may be a feature of cholelithiasis itself]
4. Intestinal obstruction.

Abdominal wall

5. Bornholm's disease [Epidemic myalgia]

Heart

6. Coronary artery disease [most common D/D]

Lower Abdomen

7. Mesenteric vascular occlusion [rare]
8. Pyelonephritis
9. Salphingitis in Women

Liver

10. Acute Hepatic congestion
11. Hepatic crisis of sickle cell anemia.
12. Hepatitis and Liver abscess.

CNS

13. Radiculitis

LUNG

14. Right lobar pneumonia

Differential diagnosis for chronic cholecystitis

1. Peptic Ulcer: Commonest differential diagnosis and almost all patients would have had treatment for peptic ulcer.
2. Hiatus Hernia: An associated feature in Saint's triad may mimic chronic cholecystitis. .

Differential diagnosis for Choledocholithiasis with jaundice

- Biliary stricture and neoplasm
- Ampulla of Vater growth
- Head of the pancreas growth
- Chronic calculous pancreatitis
- Mirrizi syndrome.

ACALCULOUS CHOLECYSTITIS

Acalculous cholecystitis patients usually have features of acute abdominal signs and symptoms (critically ill patients). Patients usually give history of major trauma or major surgery or patient may be critically ill under intensive care. Co morbid ailment includes Multi Organ Failure Syndrome(MOFS).

INVESTIGATIONS

PLAIN ABDOMINAL RADIOGRAPHS

The films are usually obtained in AP projection. Special view to visualise the gall bladder like penetrated AP film over the gall bladder area in a suspected case of calculous Cholecystitis is more contributory to the surgeon.

The gall bladder lies usually parallel to spine at the level of 11^{th} and 12^{th} ribs. Fundus lies usually in opposition to the duodenal cap and anterior to renal shadow.

In case of **choledochal cyst** plain radiograph shows 1.mass effect 2.calcified cyst 3.stones within cyst. Barium Upper gastrointestinal contrast radiograph shows evidence of varicose as feature of portal hypertension, displacement of the duodenum by a mass effect.

Only 10 % of the gallstones are radio opaque, in contrary to renal stones, which are 90 % radio opaque. 10 -20 % of cholesterol stones and 50 % of pigment stones are radio opaque. The opacity is due to the presence of calcium greater than 4 % as carbonate or phosphate. Rarely calcification of the gall bladder wall and presence of air when communication exists between the intestine and the gall bladder as fistula can be detected.

ORAL CHOLECYSTOGRAPHY [OCG]

Until mid 1970's oral cholecystogram was the golden standard for the evaluation of the gall bladder diseases. With the advent of ultrasonogram and hepatobiliary scintigraphy the role of cholecystogram has become very much limited, almost virtually eliminated from routine investigations of Cholelithiasis and biliary tract pathologies.

Graham and Cole [1924] introduced oral c116lecystography Iopanoic acid [Telepaque] and Sodium tyropaonate [Bilipaque] are the dyes commonly used. Standard dose is 3g [6 tablets of telepaque]. Patient is advised to avoid fat for 3 days. At 9 pm tablets are taken orally. Overnight fast is observed. X -rays are taken on next day morning at 9 am. A fatty meal is given and X-ray is taken after 45 minutes. This film will show contractibility of the gall bladder. If the gall bladder is not visualized a double dose [6g] is given and reexamined. If the gall bladder still not visualized, the gall bladder disease is certain.

Visualisation of the gall bladder depends on both cystic duct potency and the gall bladder mucosal capacity to absorb water and concentrate the contrast.

Causes for non visualisation of the gall bladder are given below

- occlusion of cystic duct
- Chronic cholecystitis.
- Serum Bilirubin more than 2.5 Mg m%
- Trapping of the tablet in GIT
- Malabsorption syndromes
- Diarrhoea
- Diminished liver function

Presence of filling defects that seeks gravitational dependency is diagnostic of cholelithiasis. Floating stones indicate high cholesterol content. Contrast material adheres to the surface of the stone and mimics calcified rim [salzmann effect).

Filling defect not moving when patient's position is altered is unlikely to be a. gallstone. The accuracy of oral cholecystogram is around 90%.

ULTRASONOGRAM

Choledochal cyst diagnosed most often by ultrasonography .Type of cyst associated features of complication(evidences of portal hypertension) depicted thro real time sonography.

In imaging the gall bladder real time ultrasonography has made ultrasonogram a primary diagnostic technique. The revolution brought about by ultrasonogram is attributed to its simplicity, repeatability and noninvasiveness. Rapid diagnosis of the gall bladder and biliary tract pathology without a need of exposure to ionising radiation, medication, double dose examination etc., are possible with USG. The surgeon feels more secure and definite when operating on a patient with cholelithiasis shown by USG than with a non visualised gall bladder of oral cholecystography.

Static or real time grey scale B mode equipment with transducers, frequencies ranging between 2.5 to 5.0 MHz is used. 5 MHz frequency allows best resolution and assessment of the size.

Focal zone is the narrowest part of the beam that must be matched to the location of stone for best image. Fasting for 6-8 hrs prior to examination is required.

Major Criteria for cholelithiasis are

1. Echogenic focus

2. Acoustic shadow

3. Gravitational dependence.

The specificity is 90 %, sensitivity is 85 %, accuracy is 95 % and false negativity is 2.9%.

In 10-15% cases gallstones may be missed mostly when they are less than 5mm in size, especially when impacted at the neck of the gall bladder. Sometimes in very obese and fatty individuals USG has some difficulties. The normal size of the common bile duct is 4- 7mm.

CT SCAN

This is not a routine investigation, useful in very fatty persons when USG fails to give a clear picture. No special preparation is needed other than fasting for 12 hrs. A series of 8-10 transverse and 5-6 longitudinal scans are performed. It is also useful in patients with a large amount of gas in the bowel and in jaundice when an associated cause can be eliminated precisely.

Its sensitivity could never equal that of an ultrasonogram. Also exposure to radiation is always there.

MAGNETIC RESONANCE IMAGING

At present the value and limitations of magnetic resonance imaging as a diagnostic modality in gall bladder disease cannot be conclusively determined.

MRI imaging of the gall bladder presently has no indication. The use of contrast both oral and intravenous administration may offer new prospective of MRI in the diagnosis of the diseases of the gall bladder.

INTRAVENOUS CHOLANGIOGRAM

With the advent of modern and safe, non invasive diagnostic modalities the role of intravenous cholangiogram has almost become a history rather than a rare investigation, which was once upon a time was 2 routine investigation of the biliary tract diseases. After 1970 with the advent of PTC, ERCP, USG and CTScan, nowadays cholangiogram is rarely done.

The contrast material used is methylglutamine Ioglycamate [cholegraffin or Biligraffin] 20 ml dose 52 % solution. It is given intravenously as infusion. It appears in bile in few minutes and permits the radiological visualisation of the bile passages than the gall bladder. Oral cholecystography is superior in visualising the gall bladder.

Indications

- Intolerability to oral contrast materials.
- Post Cholecystectomy syndromes.

Contraindications

- Raised Plasma Bilirubin more than 3 mgm /100 ml.
- Impaired Renal and liver functions
- Previous 0 C G within 48 hours.
- Paraproteinemias
- Thyrotoxicosis
- Sensitivity to contrast materials.

Following could be assessed in IV Cholangiogram

- Duct size, termination, filling defects in the lumen
- Flow of contrast into the duodenum
- Any retrograde filling of the intrahepatic radicles.

PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY

Huard and Doxylon Hop first described the technique of percutaneous transhepatic cholangiography in 1937. The procedure was sparingly used for 30 years due to lack of fine chiba needles [23 gauge].Till the introduction of Chiba needles 18 gauge needles were used which resulted in high incidence of intraperitoneal haemorrhage and laprotomy subsequently.

Technique

A duct which should be within the liver to lessen the chance of intraperitoneal bile leakage is chosen. Fluroscopy or image intensifier is ideal both for introduction of the needle and during the injection of the dye. After preparation and draping, needle is introduced in the 8th or 9th intercostal space in the midaxillary Tine parallel to the table.

Failure to enter the biliary tree is common particularly if the ducts are not dilated. Virtually all dilated ducts are opacified during the procedure.

Indications

- Obstruction in Biliary tract.
- To know the site of obstruction.
- Failure of ultrasonogram and CT Scan in showing dilated ducts in a case of obstructive jaundice case.

Contra Indications and Preventive measures

- Significant coagulopathy from any cause
- Significant Ascites
- History of allergy to contrast material
- Suspected right lobe liver abscess
- Suspected case of Hydatid cyst.

Complications

Sepsis [most common]	3 %
Biliary Leak	1-2 %
Haemorrhage	2 %
Death	0-0.9%

Interpretation

In a normal study both common bile ducts, right and left hepatic ducts are visualised. The cystic duct and the gall bladder may not be visualised. But it doesn't imply cystic duct obstruction always. But in a distal C B D obstruction absence of the gall bladder indicates cystic duct obstruction or cholecystectomy. The site of obstruction will be delineated clearly but cause may not be predicted always. Filling defects in the lumen indicates gallstones.

ENDOSCOPIC RETROGRADE CHOLANGIO PANCREATOGRAPHY [ERCP]

In 1972, Kasugai et.al, first reported a success rate of 97 % in using fibroscopes to cannulate the ampulla of Vater. With the advent of side viewing endoscopy, today the success rate is almost 100 % in cannulating ampulla of Vater and injecting contrast dyes to visualize the biliary tract and the pancreatic system.

ERCP is far superior to CT Scan and ultrasonogram study, because it gives an accurate delineation of the anatomy of the biliary and pancreatic ducts.

Bile duct is cannulated if the cannula tip is directed to wards 11 or 12 0' clock position approaching from below. If cannulation is difficult a precut sphincterotomy is useful. The contrast injection into the ductal system should be done under fluoroscopy to avoid over injection there by preventing pancreatitis.

A normal cholangiogram shows biliary system with a smooth outline of the CBD normal CBD measures within 7 to 10 mm. filling defects indicates gallstones.

Indications

- In post-cholecystectomy symptoms to demonstrate any dilatation of C B D due to stones.
- In case of obstructive jaundice to know the level of obstruction.
- As a pre-therapeutic procedure before removing CBD stones.

Contra indications

- Acute non-gallstone pancreatitis.

Complications

- Pancreatitis [0.7 to 7.4 %]
- Asymptomatic hyperamylasemia [15% cases]
- Cholangitis [0.8 %]
- Bleeding very rarely from the C BD system or the ampulla
- Perforation of the duodenum with cannulation is another rare but potential Complication

Interpretation

In choledochal cyst ERCP has the advantage of defining the lower ductal anatomy and specifically, the presence of an anomalous choledochopancreatic duct junction (ACDPD).

Radiographically gallstones can be detected as filling defects in the ducts.

Limitations

ERCP is a complex procedure requires an experienced endoscopist, fluoroscopy control and side viewing duodenoscopes. The facilities are mostly lacking in smaller hospitals. So P T C seems superior to ERCP in our country [Nandy, 1988]. Cost of ERCP is also high. ERCP may be used primarily to evaluate biliary and pancreatic disease in the absence of jaundice, after cholecystectomy and when percutaneous transhepatic cholangiography is contraindicated or failed. 

RADIOISOTOPE SCANS

A Rose Bengal and 99 m Tc labeled derivatives of Aminodiacetic acid dimethyl [HID A], Diethyl ID A or Isopropyl [DI5ID A] are used. Usual dose is 5 mg. 80 % of the isotope is excreted in bile and 20 % in the urine. It allows visualisation of the biliary tree even in hyperbilirubinemia up to 20 mgm /100ml. This detects acute cholecystitis almost in all cases.

The role of radioisotope scans are very much limited in the diagnosis of cholelithiasis. So this is not indicated in chronic calculous cholecystitis. But it has a definite role in Acute Cholecystitis.

MANAGEMENT

GALL STONE DISSOLUTION

ORAL DISSOLUTION THERAPY

Thistle & Schoenfield et.al., [1971] were the first to show that oral administration of chenodeoxycholic acid to women with gallstones produced a significant rise in the ratio of Cholesterol solubilising agents to cholesterol in bile. These results were confirmed by Bell, Whitney and Dowling et.al., [1972].

Indications

- Functioning gall bladder
- Radiolucent gallstones
- Stones<2c m in Diameter
- Patient unfit for surgery

Contraindications

- Chronic Liver Disease
- Non Functioning gall bladder
- Radio opaque gallstones
- Stones> 2c m in Diameter
- Inflammatory Bowel disease
- Women of Child bearing age
- Pregnancy

DOSE AND DURATION

Chenodeoxycholic acid in a dose of 5-25 mgm /kg of body weight has been tried in various trials, but 15 mgm/kg of body weight is adequate.

Duration of the treatment varies between 6 months and 2yrs depending on the size of the gallstones. Periodical ultrasonogram is needed to confirm that stones are dissolving.

SIDE EFFECTS

1. Diarrhoea due to secretion of water and electrolytes by the colonic mucosa.
2. Hepatotoxicity.
3. Ursodeoxycholic acid, another agent to cause definite dissolution of gall bladder gallstones has equal efficacy with lesser diarrhoea and hepatotoxicity [Ma, kino, 1975].
4. Promotion of atherosclerosis.
5. Risk of carcinoma gall bladder & colon.

DRAWBACKS

Success rate is only about 40 %. If the treatment is discontinued the chance of increase in the size is almost 100%. Even after complete dissolution the recurrence rate is very high. Oral dissolution is unsuitable for our tropical setup for the following reasons [Nundy and Tandon, 1988].

1. Expensive and unavailable.
2. Considerable drop out of patients
3. Poor patient compliance
4. Tendency to induce calcification of gallstone during the treatment.
5. Cholesterol stones are rare in our country.

PERCUTANEOUS CHOLECYSTOLITHOTOMY

Recently Kellet and others [1988] have reported that gall stones can be removed from other wise normal functioning gall bladders. It may prove to be complimentary to dissolution therapy or shock wave lithotripsy. This is performed with patient under G. A adopting method and instruments used for one stage percutaneous nephrolithotomy. Potential complications such as bile leakage are likely to limit the use of this procedure.

SHOCK WAVE FOR GALLSTONES

Brendel and Enders[1983] from Germany have used shock wave treatments to treat kidney stones in humans. This same group has used similar shock waves for successful treatment of gallstones in humans. Just over four fifths of the 200 treated patients had a solitary stone less than 30 mm in diameter, and the Remainder had two or three smaller stones. Adjuvant treatment with a combination/of chenodeoxycholic and ursodeoxycholic acids was given to dissolve stone fragments. Shock waves were guided by ultrasound. Patients were immersed in water and given either epidural or intravenous analgesia. Stones were fragmented in all but two patients. Side effects included mild pancreatitis in two patients and transient haematuria in 3 percent. Only patients with a radiologically functioning and contracting gall bladder are suitable for this therapy. This technology is expensive and will not yet be available in most countries.

DISSOLUTION AND FLUSHING OF BILE DUCT STONES

Flushing may be done with saline, heparinized saline or lignocaine Saline, via the T tube with pressure less than 30 cm H2O to prevent cholangiovenous reflux and septicemia. The relaxation of sphincter of oddi may be acquired with synthetic peptide ceruletide.

Dissolution may be tried with Cholate infusions but its efficacy is very low. So Mono- octanoin which more actively clears the stones is widely used. But the most effective agent is methyiterbutylether [MTBE] which is capable of achieving gallstone dissolution within hours of instillation, in pure cholesterol stones.

OPERATIVE TREATMENT

Cholecystectomy is the ideal surgery for symptomatic calculous Cholecystitis. It may be either early .or interval. It has got another dimension recently whether open or laparoscopic. Early cholecystectomy in a carefully prepared patient in younger age groups has mortality and morbidity similar to elective cholecystectomy done 6-8 weeks after an acute attack.

SURGICAL MANAGEMENT OF CHOLEDOCHAL CYST

In recent years, Choledochal Cyst Excision, with reconstruction via a biliary – Enteric Roux – en-Y Anastomosis, has become the treatment of choice for most types of Choledochal cyst. Exceptions to this standard practices involve treatment of Intraduodenal type III choledochal cysts (choledochocele), and isolated type V intrahepatic disease (Caroli's disease).

First, although construction of a Roux-en-Y loop and dependent drainage of the cyst is technically straightforward, the site of anastomosis on the cyst wall often involves abnormal mucosa, with inflammation and fibrosis. A 68% incidence of anastomotic strictures with associated cholangitis and stone disease when cyst walls were used as sites of biliary-enteric anastomosis has been reported. Second, the risk of a malignancy developing in a retained dilated ductal structure is believed to be unacceptably high, although accurate data on such malignant transformation are not available.

PREOPERATIVE PREPARATION

Prophylactic antibiotics should be administered immediately prior to the skin incision and continues postoperatively for 24 hours. Prophylaxis against deep venous thrombosis should be instituted. Blood should be cross-matched, although usually it is not required.

OPERATIVE TECHNIQUE

Upper midline or a generous right subcostal incision. Initially, the gallbladder and cystic duct are mobilized, taking care to identify the right hepatic artery, which may be anomalous or adherent to the cyst wall. Once the gallbladder is dissected out of the gallbladder fossa, the anterior wall of the cyst is identified in the porta. This plane usually is found without difficulty. The dissection should proceed in a caudal fashion until the entire retroduodenal portion of the cyst is

freed, extending to the entry point of the common bile duct into the posterior aspect of the pancreatic parenchyma.

The anterior wall of the cyst is opened, the preoperatively placed transhepatic catheters are extracted and the posterior wall of the cyst is divided. Care must be taken to avoid injury to the pancreatic duct anatomy at this point. If cholangiography and pancreatic duct anatomy are not known preoperatively, cholangiography should be performed before division of the extrahepatic biliary tree. In most cases, the common bile duct is divided distally at or near an intrapancreatic location, when the cyst diameter has narrowed to near normal caliber. After transection, the distal common bile duct is oversewn carefully, avoiding injury to the anomalously high junction of the pancreatic duct with the bile duct. Once the choledochal cyst has been divided distally, the anterior, lateral, and posterior aspects of the cyst are dissected from this transaction point proximally, and the cyst is dissected free from the portal vein and hepatic artery. Dissection will typically proceed proximally until a normal caliber common hepatic duct is found. In most cases, the bifurcation is uninvolved with cystic dilation, and an anastomosis between the common hepatic duct and a Roux-en-Y limb of jejunum can be performed.

Reconstruction of the biliary tree is a accomplished using a 60-cm retrocolic Roux-en-Y loop of jejunum. An end-to-end hepaticojejunostomy is created, using a single layer of absorbable sutures (4-0 Vicryl or Dexon)

OPERATIVE TREATMENT OF CHOLELITHIASIS

CHOLECYSTECTOMY

Technique

A right paramedian or right subcostal incision is made. Soon after the abdomen is opened the whole biliary and pancreatic areas and the liver are examined for congestion, friability, and arty signs of ascending cholangitis or stones in the bile ducts.

Exposure of the operative Field

All steps of the operation must be carried out under direct vision with careful packing.

A large abdominal pack is used to push away the colon and a Deaver's retractor pulls this down and to the left, so that the upper margin of the duodenum is exposed. A second pack with Deaver's retractor pushes the stomach to the left and slightly up wards. A long rectangular type of retractor is placed medial to the gall bladder close to undersurface of the liver in order to rotate the liver slightly upward and thus a better view of portahepatis is obtained. Division of the visceral peritoneum: The peritoneum over the free edge of gastro-hepatic omentum is incised for 2-3 c ms near the area of the cystic duct and the porta hepatis and pushed side wards so that the cystic artery, cystic duct and bile ducts are exposed well.

Cholecystectomy Starting At The Cystic Duct

This is the more generally accepted procedure. By securing cystic artery first, three things are accomplished:

1) The subsequent dissection is carried out in a relatively dry field.
2) After the division of cystic artery, the cystic duct uncoils itself and will be Straightened out and clearly defined up to the common bile duct.
3) It eliminates the danger of serious bleeding from tearing of the cystic artery through traction upon the gall bladder. Since the cystic artery is a fine vessel, it is better if it is divided using an aneurysm needle. This artery is Closely related to the cystic lymph gland of Lundh, which may help in Identification of it.

Cholecystectomy starting at the fundus

This method is adopted in conditions where the identification of the duct system is more difficult. Such difficulty will arise in acute or chornic cholecystitis.

Espiner [1982] has described a modification is indicated when the gall bladder is very much thickened and inflamed, where separation of the gall bladder bed is carried out in the sub mucosal plane using a diathermy.

Lahey used finger technique for dissection of Calot's triangle in inflamed friable gall bladder.

Golden rules in case of difficulty

1. Clear identification of colon, pylorus, and duodenum is a prerequisite.
2. Fine needle aspiration to locate hidden C B D in fibrous tissue.
3. In severe inflammation in the Calot's triangle, open the gall bladder and extract all the stones and bile, then do either subtotal cholecystectomy, with cauterization of the residual mucosal membrane and the cystic duct opening is closed by a catgut suture from within. An alternative is cholecystostomy.

CHOLECYSTOSTOMY

A surgical procedure of compromise. A life saving measure, which paves the way for safety at a later date for the performance of a definite operative procedure.

Indications

1. Acute cholecystitis with gall stones,
    - W hen the patient is aged infirm and toxic.
    - Unusual technical difficulties like anatomic obscurations, extreme obesity.
    - As a preliminary measure in suppurative cholangitis with obstruction of common bile duct.
2. Chronic calculous cholecystitis - when there are risks involved in excising the gall bladder.

COMMON BILE DUCT EXPLORATION

Indications

Absolute

- If stones are felt in the biliary system
- Patient who is or was recently jaundiced per operatively.
- Patient with a recent history of severe biliary pain or rigors.
- Abnormal liver function tests, in particular a raised alkaline phosphatase.

Relative

- Past history of jaundice.
- Single faceted stone
- Multiple small stones
- Biliary sand
- C B D diameter more than 12 mm.

LAPROSCOPIC CHOLECYSTECTOMY

It has become popular in just 5 years after its introduction by Mauret [1987]. The principle advantages are short hospital stay and early return to normal activity.

Equipments required

High flow CO2 insufflators, a xenon light source, a cable to convey the high monitor video camera, irrigation devices, electrocautery and laparoscopy and laparoscopic instruments.

Technique

Under GA or epidural anaesthesia pneumoperitoneum is established with the patient in Trendelenberg position. Supra umbilical, epigastric, right mid clavicular and midaxillary 3-5 cm incisions are made. Cholecystectomy is performed and the gall bladder is delivered through one of the port usually the epigastric. Clips are used instead of ligation since it is simple and easy to apply them.

Indications

- Cholelithiasis and biliary colic
- Chronic calculous cholecystitis.
- Symptomatic gall bladder polyps.
- Resolved gallstone pancreatitis.

Contraindications

Relative	Absolute
Acute cholecystitis	Acutecholangitis
Previous abdominal operation	Severe acute cholecystitis
Minor bleeding disorder	Acute Pancreatitis
Common bile duel stones	Peritonitis
	Portal hypertension
	Pregnancy

Complications

Pre operative Bleeding	Biliary tract injury
Periumblical Heamatoma	Subpherenic abscess
Perforation of gastrointestinal tract	Subcutaneous emphysema

Chest pain

Spillage of bile &. gallstones into the peritoneal cavity.

In a recent paper by Stahlschmdt M in Oct'92 which compared 816 conventional and 812 laparoscopic cholecystectomies. [Largest series reported at present). In the Chest pain conventionally operated group re-operation was required in 2.7% while in laparoscopic procedure it was less than 1.2 %.Mortality for open procedure is .5 % but for laparoscopic surgery none out of 812 cases.

Growing experience and better definition of the contra indications for thelaparoscopic cholecystectomy might improve the results in future.

MANAGEMENT OF VARIOUS CLINICAL SITUATIONS

SYMPTOMLESS [SILENT] GALLSTONES

The previous controversy regarding the management of asymptomatic gallstones has been largely resolved by prospective studies which have shown that the vast majority of silent gallstones will not cause symptoms or complications during life. Comparative evaluation of expectant versus surgical management of asymptomatic gallstones has shown that cholecystectomy reduces marginally the life expectancy in addition to being substantially more costly.

Another argument for cholecystectomy in the past has been the prevention of gall bladder cancer, the development of which is known to be associated with the presence of gallstones. However, carcinoma of the gall bladder is rare and the overall operative mortality with the widespread adoption of prophylactic cholecystectomy in patients with silent gallstones would certainly exceed that due to cancer of the gall bladder by a significant margin. The evidence linking cholecystectomy with the development of colon cancer remains conflicting and cannot be used as a further argument against prophylactic cholecystectomy. There is no indication for cholecystectomy in the management of patients with asymptomatic gall stone disease [Cuschieri. A, 1988]

ACUTE CHOLECYSTITIS

Initial treatment with nasogastric suction, intravenous fluids and electrolyte replacement therapy. Antibiotics and analgesics if required. Two surgical options are available. They are interval [delayed or elective] cholecystectomy and early cholecystectomy.

Interval Cholecystectomy

This is the traditional approach where the acute' episode is being managed conservatively and subsequently after the complete resolution of the acute episode, patients are admitted after 2-3 months for elective cholecystectomy. These rationale for this treatment is that difficulties are encountered during surgery in the acute inflammatory episode.

Early Cholecystectomy

This is being performed for acute cholecystitis increasingly nowadays. The patient is operated electively on the next available operating list or within a few days of admission. This must be distinguished from emergency Cholecystectomy, which is done immediately after admission when gall bladder perforation is suspected. The results of several prospective clinical trials have shown clearly that early cholecystectomy is equally safer to elective cholecystectomy. Mortality and

morbidity are same for both the types of operation. But elective cholecystectomy has several disadvantages.

1. Failure of conservative treatment 10-15%.
2. Premature further episodes while awaiting for the surgery 10-15%.
3. Patient failing to report 10%.
4. When surgery becomes imperative between second and fourth weeks the incidence of iatrogenic injuries is very high.

Early cholecystectomy is best performed using the fundus first approach. It is customary to administer prophylactic antibiotics.

CHRONIC CALCULOUS CHOLECYSTITIS

For the treatment of biliary pain non opiate analgesics preferably drugs are preferred because opiates may cause spasm of sphincter of oddi which cannot be countered by hyoscine. Antiemetics may be needed to control vomiting.

The definitive treatment of chronic cholecystitis is surgical cholecystectomy open or laparoscopic. There is little doubt that these patients should have their gall bladder removed as approximately 30% of them will develop complications if surgical treatment is delayed. The other option is non-surgical gallstone dissolution. It may be oral dissolution by drugs, extra corporeal shock wave lithotripsy or percutaneous transhepatic cholecystectomy.

ASSOCIATED DUCTAL CALCULI

The treatment is choledochotomy and cholecystectomy. The stones are extracted by means of biliary balloon catheters, stone grasping forceps or Dormia basket, preferably under visual control or with a choledochoscope. A “T” tube is inserted and choledochotomy wound closed. If CBD is grossly dilated with papillary stenosis, a drainage operation is indicated. Choledochoduodenostomy or transduodenal sphincteroplasty is done. Endoscopic sphincterotomy and removal of stone is the recent and effective way to manage stones in CBD. Endoscopic sphincterotomy’ with extraction of stone with DORMIA basket under fluoroscopic control is the best and most effective method available. If the above fails because of large’ stone sphincterotomy and stenting are done. Later lithotripsy is used to break the stone.

OBSERVATION

The overall incidence of surgical procedures for biliary pathology was 1.3% (40 cases of benign biliary disorder out of 2971 overall operated cases for 2005 to 2006) of all hospital admissions between may 2005 – May 2006.

40 patients of biliary disorder (Benign) age ranged between 18 to 80 yrs. Mean age 49 yrs. Maximum number of cases occurred in fifh and sixty decades. Female to male ratio for Cholelithasis 1:4:1.

Female to male ratio for choledochal cyst 2:1. 37 patients belonged to low socio economic status. 30 patients were taking mixed die.Incidence of choledochal cyst is one per thousand persons who had major surgeries (Johnhpkins-Maingot Abdominal surgeries).In our study population it is one per two thousand (total number of cases operated in the year 2005 to 2006 in TMCH was 5942 ,number of patients operated for choledochal cyst was three).

CLINICAL PRESENTATION

Abdominal pain, which was localised to right hypochodrium was the presenting symptom in 36 patients (90 %). 3 cases of Cholelithiasis presented with jaundice and all of the three were found to have CBD calculi.

2 patients with choledochal cyst were jaundiced and had abdominal pain none of our patients had palpable gallbladder.

Two of the Acalculus cholecystitis patients had guarding rigidity rebound tenderness as presenting feature with H/o sudden severe abdominal pain.

Associated symptoms of nausea, vomiting dyspepsia in almost 98 % of population of my study groups.

BIOCHEMICAL INVESTIGATION

Six of our patients had elevated blood urea /serum creatinine. In our series 3 patients with increased serum bilirubin had CBD stones also had increased serumalkaline phosphatase.

Promrombintime prolonged 3 patients which became normal after Vitamin K injection.

ULTRASONOGRAM

Abdominal USG was taken for all patients, 3 of them showed CBD calculi along with GB calculus.

2 of the 3 patients with choledochal cyst was also identified by USG..

2 of the three patients operated as an emergency showed thickened gallbladder without any evidence of calculous.

MANAGEMENT

Of all 34 patients with cholelithiasis. 31 patients were treated with cholecystectomy alone. 3 patients who had CBD calculus, CBD exploration and stone removal was done, 2 of them had 'T' tube drainage .For the one who had distal CBD stone choledochoduodenostomy (impacted stone-distal CBD).

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Emergency cholecystectomy was done in 3 patients, one of them died of cardiac failure 11th pod. Other two had wound dehiscence seven pulmonary infections.

In one patient cholecystostomy was alone feasible due to extensive adhesions.

Two patients with choledochal cyst were treated by Hepaticojejunostomy done (ROUX-EN-Y) after excision of Cyst. For one patient choledochocystojejunostomy done in view of poor general condition, who died of septicemia on 3rd pod.

INCISIONS

Right paramedian 6 patients.

Right subcostal 30 patients.

Midline 4 patients.

EMERGENCY CHOLECYSTECTOMY

Three of our patients were operated as an emergency procedure, since all the three had features of peritonitis. Emergency cholecystectomy was done in all the three. One patient had perforation of gallbladder.

BIOCHEMICAL ANALYSIS:

Pure cholesterol stones were found in 3 cases (12.5%) pure pigment stones in 3 cases (12.5 %) mixed stones were found in 18 cases (75 %).

HISTOPATHOLOGY

For all the 40 patients operated gall bladder specimens sent for Histopahological examinations,3 patients had gangrenous cholecystitis, 4 patients showed evidence of acute cholecystitis. 2 patients had glandular type choledochal cyst. No associated carcinomatous changes were noted in this series.

DISCUSSION

Choledochal cyst rare occurrence in western population. In our series choledochalcyst affects significant number of patients with benign biliary pathology. Acaculus cholecystitis affects people who had severe trauma, major surgery. Gall stone disease is a common occurrence. It is the commonest diseases involving the biliary tract and is associated with significant morbidity and mortality. The prevalence of the disease is affected by multiple factors like geographical distribution, genetic, different life styles and infection in the biliary tract. With modern improvements in preoperative and Postoperative care, a more aggressive surgical approach to calculus diseases of the Gall bladder has evolved.

INCIDENCE

Choledochal cyst occurs in young females with mean age of 30 compared with studies of western population John Hopkins mean age 23, Hannover 47, Kyushu 24.

AGE INCIDENCE

Mean Age Incidence

Kyushu	John Hopkins	Hannover	Our Study
24	23	47	30

Age Incidence of Choledochal cyst in our study population is comparably similar to International study groups.

SEX RATIO

Mean Sex Ratio

North Western	John Hopkins	Hannover	Kyushu	Our study
17:4	6:1	10:3	41:5	2:1

Female, male ratio 2:1 in our study population comparably similar to Hannover study groups.

Northwestern 17:4.

CYST TYPE

Commonest choledochal cyst type is type I (75%), comparable with international study. One case type not revealed.

CYST TYPE

	JOHN HOPKINS n=42	**NORTHWESTERN n=21**	**HANNOVER n=13**	**OUR STUDY n=3**
I	50	67	54	75
II	2	33	8	-
III	5	0	5	-
IVa	33	15	37	-
IVb	7	8	2	-
V	2	8	0	-

ACALCULOUS CHOLECYSTITIS

Acalculous cholecystitis affects 3% of all surgical biliary tract cases in most large centres. In our series 7.5% population affected by acalculous cholecystitis. Patients who were seriously ill or h/o major surgery association is 75% of my study group.

The classical victim of gall bladder disease is a fat, fertile, flatulent, female of fifty (Rains et. al., 1978).

Gupta (1967) reported the range of 9-80yrs, while Vijaypal ,observed the range of 17-74 yrs and Tyagi et.al., 18-70 yrs. Similarly a wide range (16-62) yrs

is observed in our series also. A maximum incidence in 4^{th}, 5^{th}, 6^{th} decades was observed in Gupta et.al., series, in Vijaypal et.al., series and Tyagi et.al., series (1992) (63.4%). Similar observation was made in our study also.

The mean age of incidence in our study (45 yrs) is compared with other series in the table.

A varying female preponderance from 2:4:1 to 6.5:1 has been observed in several studies. In our series also there is a female preponderance with a female to male ratio of 3.4:1.

SOCIO ECONOMIC STATUS

People of lower socio economic status are at greater risk (90%) than those of high social status.

CINICAL PRESENTATION

Abdominal pain was the most common complaints in almost all patients with cholecystitis .Right Hypochondrium pain being 90 %.

Choledochal cyst patients presented with abdominal pain and jaundice.

John Hopkins study **Our study**

Abdominal pain	87 %	100 %
Jaundice	42 %	75 %
Fever	26 %	25 %
Nausea / vomiting	29 %	30 %
Abdominal mass	13 %	0 %

Cholelithiasis:

Right Hypochondrium pain 90 % in our study series, comparable 84 % in Vijay pal et.al (1980).

Ganey et.al (1980) reported incidence of jaundice to be 10 % in his series and Vijay pal et.al. 22 % in his series. In our series 3 cases (9.5 %) had jaundice Tenderness in Right hypochondrium reported by Vijay pal et.al, (1980) in 68 % of his cases. It was observed in 90 % of our cares.

BIOCHEMICAL INVESTIGATIONS

Serum bilirubin was above 2 mg % in 12 cases (16%) with a maximum level of 12.3 mg %. In Vijay pal et.al, (1980). In our series it was above 2 mg % in 5 cases.

Serum alkaline phosphates level was with in normal limits in only 19 cases (25.33 %) in Vijay pal et.al, series.

Whereas it was normal in 87.5 % In our study groups. Serum urea / creatinine, elevated in all three patients of Acalculus cholecystitis with associated electrolyte abnormalities suggesting MODF (Multi organ dysfunction).

Radiological investigation plain X ray abdomen showed features of paralytic ileus in 2 of 3 patients who had acalculus cholecystitis.

USG

Of all the investigation, USG abdomen was the most informative. Of the 40 cases for which USG was done, 34 patients with cholelithiasis USG abdomen showed stones with an accuracy rate of 100 %

Gallbladder calculi alone in 31 of 34 patients coming under cholelithiasis study groups were observed, GB with GBD calculi in 3 Patients.

Our accuracy with USG is 100 %. Comparable to Mcshorry et.al, series (1989) 90 % and that of schwartz series (1990) 100 % CBD exploration and choledocholithotomy was done in 3 of the 3 cases in whom USG showed dilation CBD.

USG can diagnose a choledochalcyst. In John Hopkins study groups 16 of 32 patients; (choledochal cyst) was diagnosis preoperatively. In our series 2 of 3 persons (75%). Thus USG can be misleading, if diagnosis of choledochal cyst disease is unsuspected or not considered.

MANAGEMENT

Of the 34 with cholelithiasis 30 patients operated for cholecystectomy alone. 3 patients with CBD calculus. Choledocholithiotomy with 'T' tube drainage in 2 patients choledochoduodenostomy in one patient was done. cholecystostomy was alone feasible in one patient due to severe adhesion.

The various methods of treatment adopted are compared with those of Vijay Pal et.al, and Ganey et.al, below

S.No	Procedure	Our Study	Vijay et.al.,1980	Ganey et.al., 1980
1.	Cholecystectomy	88 %	90 %	98 %
2.	Cholecystectomy with CBD exploration	9 %	16 %	27 %
3.	Cholecystostomy	3 %	-	1 %

EMERGENCY CHOLECYSTECTOMY

Incidence of emergency procedure for benign pathologies is 3% in any major hospital. Most common benign biliary pathology demanding emergency biliary surgery is acalculous cholecystitis. In our study emergency cholecystectomy was done in patients who had acalculous cholecystitis 100%.

CHOLEDOCHAL CYST

In recent years choledhochal excision with reconstruction via a biliary-Enteric roux-en-y anastamosis has become the treatment of choice for most types of choledhochal cyst with exceptions to intraduodenal type-3 choledhochal cyst and isolated type V intra hepatic (caroli's disease).

Of our patients radical excision with hepatico jejunostomy (Roux-en – Y) done. One Patient in view of poor general condition choledochocystojejunostomy done.

Mortality:

One among three patients operated for choledochal cyst died of septicemia on 3rd pod.

One among 3 patients operated for acalculus cholecystitis as an emergency died of cardiac failure on 11th pod.

Morbidity:

One among 3 who was operated as an emergency for gangrenous gallbladder had wound dehiscence and burst abdomen on 10th pod, with severe systemic ailment (pulmonary complication).

2 among many patients with calculus disorder had wound infection, and treated appropriately recovered well.

SUMMARY AND CONCLUSION

Benign pathologies involving biliary tract is associated with significant morbidity and mortality. Gall stone disease is the most common disease involving biliary tract. Acalculus cholecystitis present in critically ill patients had significant mortality and morbidity. 40 cases of well documented benign biliary disorders admitted in Thanjavur Medical College Hospital during the period between Jan 2005 to May 2006 were studied in detail. USG plays a significant role in preoperative diagnosis. Choledochal cyst a rare biliary pathology occurs predominantly in young females had significant mortality and morbidity. Acalculous cholecystitis rare biliary disorder presents as an acute emergency most often demands emergency cholecystectomy a life saving measure.Chronic cholecystitis is the most common clinical presentation amongst calculous cholecystitis. Amongst cholelithiasis significant population had stones in the common bile duct , most of them had jaundice , demanding CBD exploration mandatory procedure. Cholecystectomy is the most common procedure for benign biliary disorder. Morbidity rate was high among persons who had emergency cholecystectomy who also had associated comorbid ailment.

The following conclusions were made in our study;

1) The overall incidence of procedures in biliary system is about 1.3 % in our hospital elective list.
2) Age incidence for benign biliary disease ranged 18 to 80 years with mean age 49 yrs. Patients of 4^{th} ,5^{th} , 6^{th} decades were the commonest victims.
3) Female preponderance 1:4:1 for calculus disorder, female to male ratio 2: 1 for choledochal cyst was observed in our study.
4) Calculus disorder is the most common benign biliary disorder warranting surgery.
5) Right Hypochondriac pain was the commonest symptom of benign biliary disorder.
6) Choledochalcyst a rare benign pathology mostly presents with jaundice and Right hypochondriac pain, had significant mortality rate .
7) Ultrasonogram of the abdomen was invaluable in the diagnosis of biliary Pathology because of its simplicity, safety, repeatability and an accuracy of 100% in our series.
8) The Commonest histopathological changes associated with gallstone were chronic cholecystitis. Glandular type histology most common amongst choledochal cyst .Associated carcinomatous changes is nil in our series.
9) Elective Cholecystecytomy was the most widely followed method of surgical treatment. Choleystectomy starting at calot's triangle was the commonest technique used.

10) Acalculus cholecystitis occurs in significant group of persons whoare critically ill demanding emergency cholecystectomy a life saving measure.
11) Morbidity rate in our study population is 7.5% most of them had comorbid illness.
12) Mortality rate in our series is 5 %

LAPAROSCOPIC biliary surgery is now replacing open surgery in our hospital, since majority had open surgery study population who had laparoscopic surgery was insufficient to be included in our study.

In Judicially selected, carefully prepared and operated cases, the results are bound to be gratifying.

PROFORMA

Name:	**D.O.A.**
Age:	**D.O.D**
Sex:	**D.O.O**
IP. No.	**Unit**

Complaints of Present history

Pain: Site

Duration

Character

Radiation

Relation to deep breathing

Aggravating factors:

Relieving factors:

- Vomiting / Nausea
- Fever
- Duration / Grade / Nature / associated with Chills and rigor
- Flatulent dyspepsia
- Colour of Urine
- Colour of Stool

Past History

Similar complaints

Jaundice

Fever

Diabetes

Hypertension

Cirrhosis

Personal History

Family History

Menstrual History

DIET:

VEG

MIXED

OILY Food Intake

Treatment History:

HIO Any drug Intake

OCP

General Examination

Temperature:

Pulse rate:

Jaundice

Anaemia

Features of Hyperlipidemia

Examination of Abdomen

Inspection

Palpation

Tenderness Site

Murphy Sign

Liver

GB

Spleen

Associated Conditions

Renal Disease

Colonic motility Disorders

Reflux Esophagitis

Investigations

Urine : Albumin / Sugar

Bile Salt / Bile Pigments

Blood : Hb%

TC: DC: ESR:

Blood sugar

Urea

Serum Creatinine

LFT: Serum Bilirubin

Serum Alkaline Phosphatase

SGOT / SGPT

Prothrombin time

Plain X-ray Abdomen

USG: GB Stones Multiple Solitary

Wall thickness

Enlargement of GB

CBD stone

CBD dilatation

Liver

Operative Details

Emergency

Elective

Incision: (RT) Subcostal

(RT) Paramedian

Midline

Anatomic Findings

GB Enlarged

Inflamed

Gangrenous

Procedure

Cholecystectomy Fundus first

Calot's Triangle first

Cholecystectomy Simultaneous

CBD Exploration

'T' tube kept

Any other procedure

Stones: No

Size

Shape

Texture

Post Operative Period

Complications

Fever

Biliary leak

Peritonitis

Wound infection

Removal of Drain

Removal of Suture

Removal of 'T' tube

Total period of stay

Analysis of Stone

Biopsy Report

Microbiological Report

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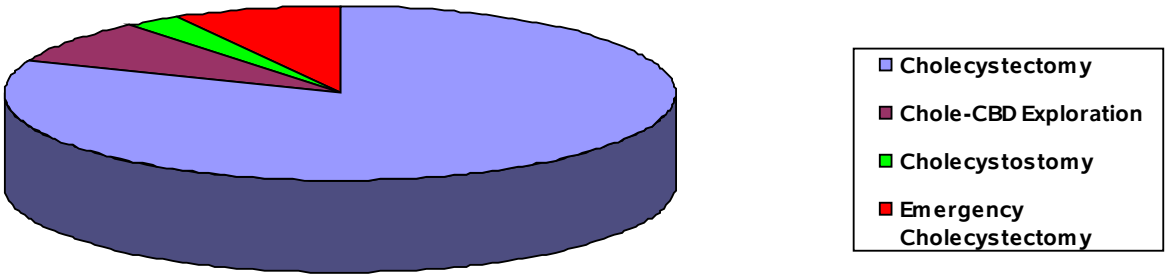
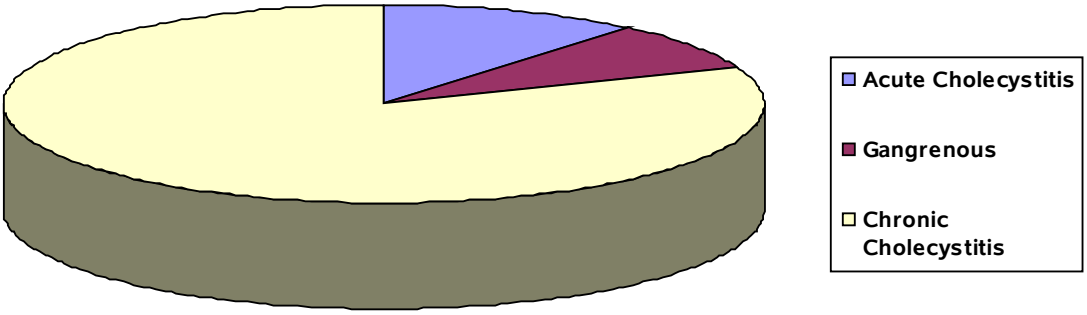
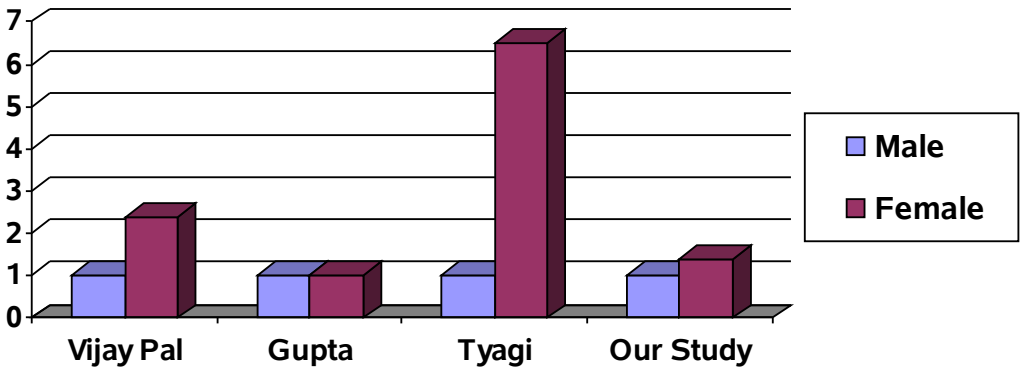
SURGICAL PROCEDURE

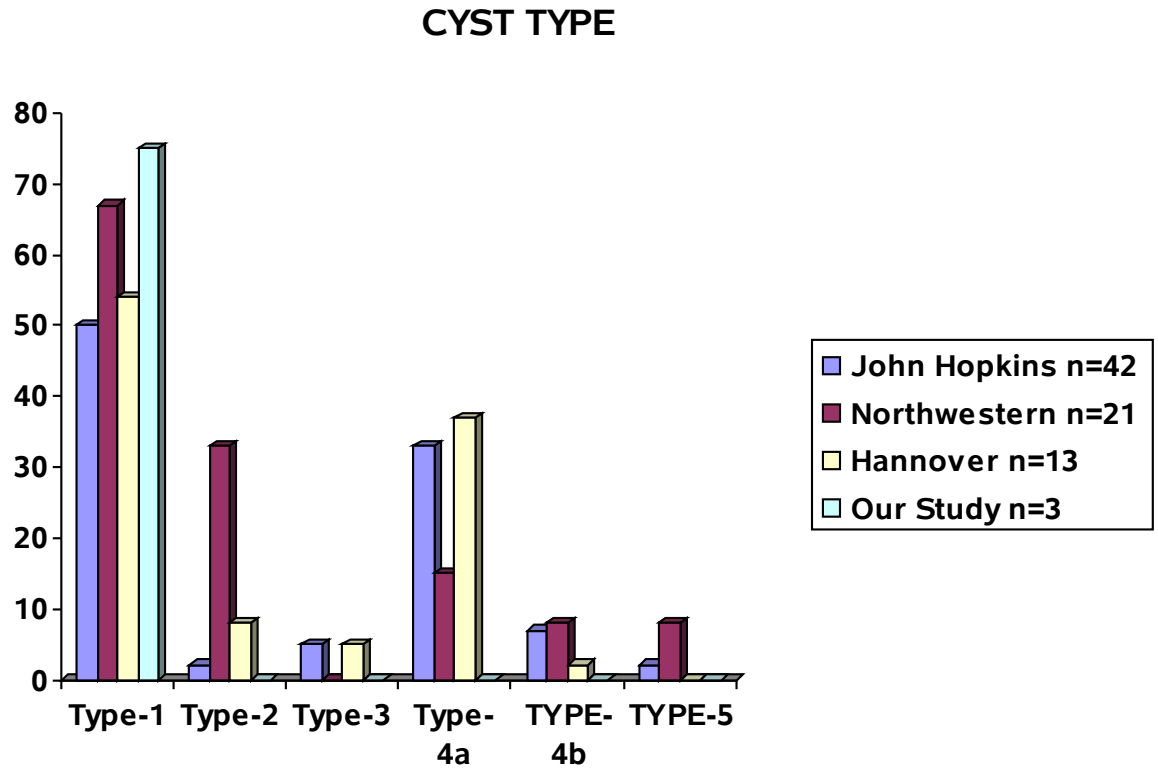


HISTO PATHOLOGY



SEX INCIDENCE FOR CHOLELITHIASIS

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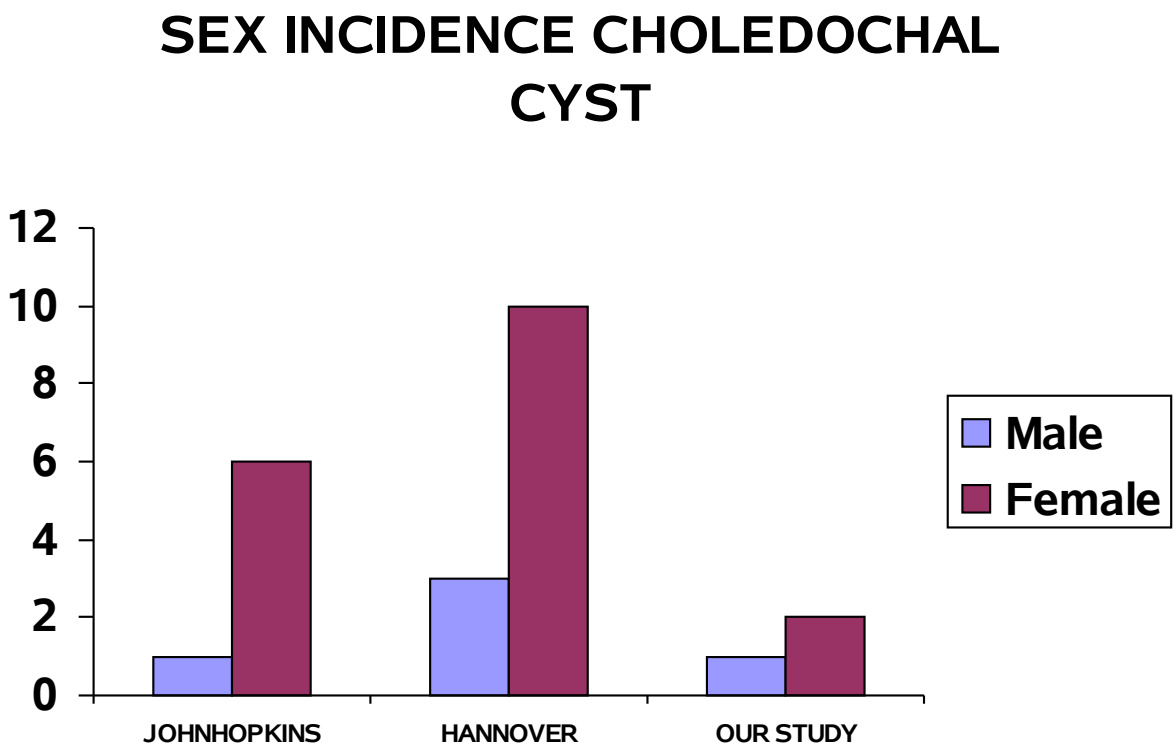
80
70
60
50
40
30
20
10
0
Type-1
Type-2
Type-3
Type-4a
TYPE-4b
TYPE-5
John Hopkins n=42
Northwestern n=21
Hannover n=13
Our Study n=3


SEX INCIDENCE CHOLEDOCHAL CYST
12
10
8
6
4
2
0
JOHNHOPKINS
HANNOVER
OUR STUDY
Male
Female

MASTER CHART

NAME	IP.NO	A/S	DIAGNOSIS	BIOCHEMICAL RESULT	USG	PROCEDURE	FOLLOW UP
1.MARUTHAMMAL	870307	38/F	Chronic cholecystits	WNL	Multiple calculi	Cholecystectomy	
2.SAMIKANNU	870611	30/M	Choledochalcyst	Enzymes ↑, Bilirubin ↑	CBD dilated?cystic	Choledochojejunostomy (Roux-en-Y.)	
3.VARATHARAJAN	882641	40/M	Chronic cholecystits	Blood sugar, Bilirubin	Multiple calculi		
4.SAROJA	866715	40/F	Calculous cholecytits	Hypoproteinemia	GB-Wall thickned, Solitary calculi	Cholecystectomy+ Choledochojejunostomy	
5.RAJAMANI	845260	50/F	Chronic cholecystits	WNL	Multiple Gall stones	Cholecystectomy	
6.SUJARANI	844013	36/F	Chronic cholecystits	WNL	Multiple Gall stones	Cholecystectomy	
7.LAKSHMI	846070	60/F	Chronic cholecystits	WNL	Multiple Gall stones	Cholecystectomy	
8.CHINNADURAI	842731	60/F	Gangrenoun Cholecystitis	Blood sugar ↑	Multiple Gall stones	Cholecystectomy	wound infection, resuturing
9.INDIRA	830862	16/F	Acute cholecystitis	WNL	Multiple Gall stones	Cholecystectomy	
10..MARIYAPPAN	841197	54/M	Chronic cholecystits	Blood urea, creatinine↑	Multiple calculi	Cholecystostomy	
11.CHINNAMANI	645026	33/F	Acute cholecystitis	WNL	Solitary calculi	Cholecystectomy	
12.SUNDAR	844364	36/M	Chronic cholecystits	WNL	Multiple GS with GB contracted	Cholecystectomy	
13.SUBASHINI	851061	19/4	Choledochal cyst	Bilirubin ↑	Type I cyst with calculous.	Roux-en-Y,hepaticojejunostomy.	
14.JEYARAM	861686	48/M	Chronic cholecystits	Serum cholesterol ↑	Solitary calculi	Cholecystectomy	

NAME	IP.NO	A/S	DIAGNOSIS	BIOCHEMICAL RESULT	USG	PROCEDURE	FOLLOW UP
15.SILUVAIMUTHU	863540	60/M	Chronic cholecystits	Urea,↑ creatinine↑	Multiple calculi	Cholecystectomy	
16.NATARJAN	864535	40/M	Acute cholecystitis	Leucocytosis	Multiple calculi	Cholecystectomy fundus first	
17.SELVARAJ	863811	40/M	Chronic cholecystits	WNL	Multiple calculi	Cholecystectomy	
18.NAGAIYAN	864803	22/M	Chronic cholecystits	WNL	Solitary calculi	Cholecystectomy	
19.KRISHNAVENI	865254	42/F	Acute cholecystitis	Leucocytosis	Multiple calculi	Cholecystectomy fundus first	
20.BANUMATHI	863913	60/F	Chronic cholecystits	WNL	Cholecystits	Cholecystectomy	
21.AANLIMUTHU	867977	68/M	Chronic cholecystits	Urea ↑,Creatinine↑	Cholecystits	Cholecystectomy	Wound infection, resturing
22.CHINNAPILLAI	842981	55/F	Gangrenous cholecystitis	Urea↑ , Creatinine↑ ECG LV stain	Acalculous Cholecystits	Emergency Cholecystectomy	Death 11th pod, cardiac failure
23.NAGENDRAN	870614	58/M	Chronic cholecystits	WNL	Solitary calculi	Cholecystectomy	
24.VIJAYALAKSHMI	873703	46/F	Chronic cholecystits	WNL	Solitary calculi	Cholecystectomy	
25.REVATHI	860605	18/F	Choledochalcyst	LFT↑,Bilirubin↑	Type I a cyst, GB dilated	choledochocyst ojejunostomy	Death 3rd pod, septicemia
26.CHELLAMAL	875530	45/F	Chronic cholecystits	WNL	Solitary calculi	Cholecystectomy	
27..PATTAMMAL	875442	40/F	Chronic cholecystits	WNL	Solitary calculi	Cholecystectomy	
28.RANI	877132	55/F	Chronic cholecystits	WNL	Solitary calculi	Cholecystectomy	

NAME	IP.NO	A/S	DIAGNOSIS	BIOCHEMICAL RESULT	USG	PROCEDURE	FOLLOW UP
29.THULASIRAMAN	881169	40/M	Chronic cholecystits	WNL	Multiple calculi	Cholecystectomy	29.THULASIRAMAN
30.KALIDASS	882349	42/M	Chronic cholecystits	WNL	Multiple calculi	Cholecystectomy	30.KALIDASS
31.TAMILSELVI	883642	35/F	Chronic cholecystits	WNL	Solitary calculi	Cholecystectomy	31.TAMILSELVI
32.KALIDASS	882199	50/M	Chronic cholecystits	WNL	Multiple calculi	Cholecystectomy	32.KALIDASS
33.SARAWATHI	87332	45/F	Chronic cholecystits	WNL	Multiple calculi	Cholecystectomy	33.SARAWATHI
34.ANTHONY SAMY	885951	85/M	Chronic cholecystits	WNL	Multiple calculi	Cholecystectomy	34.ANTHONY SAMY
35.VENOGOPAL	904402	80/M	Acalculous Clolecystitis	-	Distended GB	Emergency cholecystectomy	Wound dehiscensc
36.ANUSALAKSHMI	900660	35/F	Chronic cholecystits	Enzymes ↑, Bilirubin ↑,alk.po4ase↑	IHBR dilation distal CBD stone	Open cholecystectomy+CBD exploration (stone extraction)+ 'T'tube placement.	
37.AMEENABEEVI	904958	70/F	Acalculus in GB & GBD stones cholecystectomy with CBD exploration with choledochoductd enotomy	GB-Multiple calculaus GBD- Dialated	GB- multiple calculus CBD-dilated?distal CBD calculus	Cholecystectomy+ CBD exploration stone extraction, choledochoduodenostomy	
38.SAGADEVAN	901040	54/M	Calculouscholecystits	WNL	Multiple Gall stones	Cholecystectomy	
39..DHANABAKKIYAM	907784	55/F	Chronic cholecystits	Enzymes ↑, Bilirubin ↑,alk.po4ase↑	IHD calculi	Open cholecystectomy+CBD exploration (stone extraction)+ 'T'tube placement.	
40.THAMBIDURAI	913663	65/M	Acalculous Clolecystitis	-	Distended GB		